



Oregon

Kate Brown, Governor

Water Resources Department

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January 24th, 2017

Denise Dawson, Administrator
Associated Ditch Companies
85393 Bicentennial Lane
Joseph, OR 97846

Re: Wallowa Dam (W-2) – Inspection Summary

This dam was inspected on August 15th, 2016. I performed the inspection with District 7 Watermaster David Bates, Dam Safety Engineer Tony Janicek, and Water Resource Engineer Lyndsey Croghan. Representatives from the Associated Ditch Company were also there for the inspection. The Water Resources Department conducts routine inspections of the dam's exterior surfaces to identify conditions that might affect the safety of the dam. Dams are assigned a hazard rating based on downstream hazard to people and property, not on the condition of the dam. Wallowa Dam is classified as a high hazard dam. High hazard dams are inspected annually.

Summary: The dam is reasonably operated but is nearing the end of its design life due to deterioration of the concrete, gates, and appurtenances. Except for pre-authorized temporary exceedances, the reservoir level is restricted to a maximum elevation of 4375 feet. The results of this inspection are illustrated and described in the following photos and text. This inspection includes recommendations to keep the dam safe and functional.

Results of Inspection:



Log booms upstream of the dam

This reservoir has water surface elevation restricted at 4375 feet. However, similar to previous years, in June of 2016 the Associated Ditch Company was granted a temporary increase in the water level to 4377 feet. At the time of the inspection, the reservoir level was at an elevation of 4371.05 feet, based on the gage reading, nearly 4 feet below the restriction. At the time of the inspection, the reservoir was clear and contained no logs or other floating debris.



Upstream face showing deteriorating concrete

The dam and its appurtenant structures continue to deteriorate with time. As a result, the dam is near the end of its design life. The concrete on all areas of the dam is spalling and cracking. Of particular concern is the concrete on the upstream face. As noted in previous inspections, there is a band of concrete that is weak and easily removed when struck with a hammer.

In general, the concrete of the downstream side of the dam was in poor condition. Vegetation was observed growing on the surface and in cracks, but there was no noticeable seepage. Efflorescence was observed along cracks and joints. Concrete spalling was observed on the edges of the stepped buttresses and training walls. The abutments are located on glacial moraine cobbles and boulders, and not on bedrock. As a result, there is some question as to the stability of the dam.

The emergency spillway is the most important safety feature of a dam. The emergency spillway for this dam consists of 5 open bays at the top of the dam. The spillway for this dam cannot pass the design flood; this is the principal reason for the restricted reservoir level for Wallowa dam.



Gate tunnels 5 (open) and 4 (closed)



Gate tunnels 2 and 1 (both closed)

There are five gates that control the flow to each of the five outlet tunnels. The gates are manually operated frequently. The conduit tunnels experience continued deterioration, delamination and spalling, and calcium carbonate efflorescence (spires) from seepage. As was the case in past inspections, the gates cannot be completely closed and leak significantly. During the inspection, the operator closed the gate valves as much as possible so that we could observe the amount of leakage from the gates. The gates are numbered consecutively starting from the left abutment. Gates 1, 3, and 5 leak when closed, while Gates 2 and 4 do not. The leakage, in cubic feet per second (cfs), through gates 1, 3, and 5 was estimated at 20 cfs, 14 cfs, and 6 cfs, respectively. At some point in the near future the leakage will prevent effective storage of water.



Steel plate in tunnel separating from the concrete

In addition, the steel liners that were installed approximately 20 years ago, as temporary measures, are now detaching in gate tunnels 2 and 4. Due to the leaks in tunnels 1, 3, and 5, it was not possible to determine if the liner is separating in these tunnels. However, it is likely that the liner has begun to separate because the liners in both tunnels 2 and 4 are separating.



Control mechanisms for the gate valves

The control stems for most of the gate valves are bent. At the time of this inspection, the gate frames and gates themselves were still submerged and therefore not inspected. Prior inspections have noted continued deterioration of the gates and gate frames.

The Emergency Action Plan is old and contains information that is no longer valid. In addition, there is no inundation map in the Emergency Action Plan. It is standard practice for high hazard dams to have an up to date Emergency Action Plan (EAP). We are currently in the process of ensuring that all high hazard dams in Oregon have an up to date EAP. I would be happy to work with you on updating your EAP. However, there is currently a backlog of dams needing EAPs in Oregon. I should be able to begin work on an EAP for Wallowa Lake Dam in the last half of 2017. If you would like develop the EAP on your own before this time, I can send you information on developing EAPs.

Recommendation(s):

1. The dam needs to be rehabilitated or replaced very soon. The process for rehabilitation/replacement can be lengthy so the process should begin as soon as possible.
2. Re-attach the steel liners in the outlet tunnels.
3. The gates for the outlet tunnels will most likely not last that much longer. If these fail, you will lose the ability to store water. As a result, these will need to be replaced in the near future.
4. Until rehabilitation/replacement, continue to operate this dam as per the restriction we have previously established and continue to enforce.

We use a standard inspection form, and a copy of the field inspection sheet for this dam is attached. I plan on another routine inspection next year. Please let me know if you have any questions about this inspection. I look forward to future inspections of this dam.

Sincerely,

A handwritten signature in blue ink that reads "Keith Mills". The signature is fluid and cursive, with the first and last names being clearly legible.

Keith Mills, P.E., State Engineer
(503) 986-0840
Cell (541) 706-0849

C: David Bates, Watermaster District 7
Dam Safety File W-2

IV. Conduit	Control: <input checked="" type="checkbox"/> Manual <input type="checkbox"/> Power <input type="checkbox"/> Other <input type="checkbox"/> Conduit Control missing	Rating
Inlet	<input checked="" type="checkbox"/> Submerged <input type="checkbox"/> Debris on Trash Rack <input type="checkbox"/> Deterioration	—
Trickle tube	<input checked="" type="checkbox"/> None <input type="checkbox"/> Screened <input type="checkbox"/> Blockage <input type="checkbox"/> Deterioration	—
Control/Stem	<input checked="" type="checkbox"/> Operable <input type="checkbox"/> Damaged <input type="checkbox"/> Missing <i>CONTROL STEMS ARE BEAT</i>	3+
Valve(s) cycling	<input type="checkbox"/> Frozen <input type="checkbox"/> unknown <input type="checkbox"/> past year <input checked="" type="checkbox"/> frequent <i>DONT CLOSE</i>	3
Size:	Material _____ Condition _____	—
Outlet Structure	<input type="checkbox"/> Overgrown <input type="checkbox"/> Clean <input type="checkbox"/> Pressurized <input type="checkbox"/> Leaking _____ gpm	—
Secondary outlet	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Type _____ Diameter _____ in.	—
Comments:	<i>GATES 1,3,5 DO NOT CLOSE</i>	

V. Spillway	<input type="checkbox"/> Earth <input type="checkbox"/> Rock <input checked="" type="checkbox"/> Concrete <input type="checkbox"/> Other	Rating
Modifications	<input checked="" type="checkbox"/> None <input type="checkbox"/> Reduction in capacity <input type="checkbox"/> Feature not on design	—
Approach Channel	<input checked="" type="checkbox"/> Clear <input type="checkbox"/> Trees/brush <input type="checkbox"/> debris <input type="checkbox"/> erosion	4
Control Section	Width _____ Depth _____ <input type="checkbox"/> Concrete <input type="checkbox"/> Rock <input type="checkbox"/> Soil <input type="checkbox"/> Culvert <input type="checkbox"/> Unstable	—
Flashboards/Gate	<input checked="" type="checkbox"/> None <input type="checkbox"/> In place <input type="checkbox"/> operational <input type="checkbox"/> deteriorated	—
Discharge Channel	<input checked="" type="checkbox"/> Clear <input type="checkbox"/> Trees/brush <input type="checkbox"/> leakage <input type="checkbox"/> headcutting (_____ feet approaching control section, depth _____ feet.)	4
Stilling basin	<input type="checkbox"/> N/A <input checked="" type="checkbox"/> Functional <input type="checkbox"/> Minor Erosion <input type="checkbox"/> Severe Erosion/Undercutting	4
Aux. Spillway	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No (use comments below)	—
Comments:		

VI. Access and Security		Rating
Vehicle access	<input checked="" type="checkbox"/> Public road <input checked="" type="checkbox"/> all weather road <input type="checkbox"/> dirt road <input type="checkbox"/> cross country	4
Fencing, signage	<input type="checkbox"/> Remote <input checked="" type="checkbox"/> Gate <input checked="" type="checkbox"/> Secure Fence <input type="checkbox"/> Camera <input type="checkbox"/> Uncontrolled	4
New Structure below dam	Dwelling _____ feet Paved public road _____ feet Other sig building _____ feet	—
Emergency Action Plan	<input type="checkbox"/> Not required <input type="checkbox"/> Completed _____ at dam (dated _____) <input checked="" type="checkbox"/> None	3
Comments:	<i>EAP IS IN DEVELOPMENT</i>	

Instrumentation data reviewed: ☐ N/A ☐ Yes ☐ No

Other:
